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Effects of ocean acidification on the calcification of otoliths of larval Atlantic cod, Gadus morhua L.

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The aragonitic calcium carbonate composition of the otoliths of teleost fishes could bring the organism in direct risk to ocean acidification. The potential effects of increase in atmospheric CO_2 on the calcification of the otoliths were investigated by rearing Atlantic cod larvae (Gadus morhua L.) in three pCO_2 concentrations, control-370, medium-1800, and high-4200 ppm from March to May 2010. Hypercalcification of otoliths were observed from 7 to 46-dph cod larvae cultured at elevated pCO_2 concentrations. The sagittae and lapilli were largest at the high pCO_2 treatment followed by medium and control with the biggest difference (83.8%) in mean otolith (sagitta) surface area at 32-dph between the high and control groups. The shift in the growth rates of the sagittae and lapilli also occurred much earlier in the high treatment with the growth of the sagitta surpassing that of the lapillus already at 32-dph. On the other hand, Atlantic cod larvae showed no trends in fluctuating asymmetry of the otoliths vis-a-vis the increase in otolith growth from elevated pCO_2.